U.S. NUCLEAR REGULATORY COMMISSION

REGION III

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Licensee:	Consumers Energy Company
Facility:	Palisades Nuclear Generating Plant
Location:	27780 Blue Star Memorial Highway Covert, MI 49043-9530
Dates:	July 7-10, 1998
Inspectors:	R. L. Glinski, Radiation Specialist D. H. Nissen, Radiation Specialist
Approved by:	Gary L. Shear, Chief, Plant Support Branch 2 Division of Reactor Safety

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EXECUTIVE SUMMARY

Palisades Nuclear Generating Plant
NRC Inspection Report 50-255/98014

The purpose of this inspection was to review the planning and radiological controls for a resin sluice, the calibration of personal contamination monitors (PCMs), the management and operation of the area and process radiation monitors, and the actions completed to address open items regarding the waste gas system and accident gaseous iodine determination. The following conclusions were reached:

- The Chemical and Radiological Services (C&RS) and operations staffs effectively coordinated and controlled the activities associated with the fuel pool resin sluice. During the evolution, communication, surveys, ALARA measures, and system monitoring were thorough, and the task was successfully completed with a reasonable dose (Section R1.1).

- The calibration program for the area and process radiation monitors was well implemented, and the data indicated that the system electronics and detectors functioned properly. No materiel condition issues were identified, and the replacement of problem components improved system performance. However, a number of the process radiation monitor calibrations were performed into the Technical Specification extension period, and the plant management stated that this scheduling issue would be resolved (Section R2.1).

- The C&RS staff conducted the daily, monthly, and quarterly channel function checks of area and process radiation monitors in accordance with station requirements, and the results indicated that the monitors continued to perform as intended. The compensatory actions for inoperable process radiation monitors were properly performed, but issues regarding the challenge to and the guidance for chemistry personnel were identified (Section R2.2).

- The management of the personal contamination monitors was effective, as evidenced by the successful completion of calibrations and operational checks at the required frequency. However, an issue was identified regarding a security gate house PM-7 monitor which alarmed in an incorrect zone when the source was not located near that zone. In addition, the low limit fail setpoints for the PCM-1Bs were not set conservatively (Section R2.3).

Report Details

IV. Plant Support

R1 Status of Radiological Protection and Chemistry (RP&C) Controls

R1.1 Radiological Controls During a Spent Fuel Pool Resin Sluice

a. Inspection Scope (IP 83750)

The inspectors reviewed the applicable procedures, attended technical and radiation work permit (RWP) pre-job briefings, and observed the sluice of resin from the fuel pool (FP) demineralizer tank (T-50) to the spent resin storage tank (T-100). The inspectors also reviewed the measures to maintain radiation dose As-Low-As-is-Reasonably-Achievable (ALARA) and interviewed station staff regarding radiological controls.

b. Observations and Findings

The inspectors attended both the technical and the RWP pre-job meetings, during which the operations and radiation protection (RP) staff thoroughly reviewed the evolution and the measures to maintain the dose ALARA for this task. The inspectors noted that the planning and coordination between the RP and operations staffs were extensive, and sufficient time was provided for any questions and clarifications from the staff. The job expectations, staff duties, dosimetry alarm setpoints, dose estimates, potential hazards, job hold points, contingencies, and requirements for working in high radiation areas and for radiation controlled doors (RCDs) were clearly discussed. The ALARA measures included monitoring of the evolution with a camera mounted to observe the resin pump (P-107) sight/flow glass, radiation monitors located on P-107 and the F57A filter (in case of resin breakthrough or plugging), and an electronic dosimeter (ED) mounted on the common header of the T-75 suction piping to monitor the radiological conditions. In addition, the operations worker in the T-50 room was provided with dedicated health physics technician (HPT) coverage.

The inspectors observed the T-50 resin sluice and noted that this evolution was well implemented. In particular, the staff were provided with communication headsets which enabled key staff to communicate directly during the sluice. This direct communication allowed the staff to effectively coordinate the numerous steps in this evolution. Since the dose rates on T-50 ranged up to 10 roentgen per hour (10 R/h), an HPT provided line-of-sight coverage for all activities in this room, which met the requirement for the two-man entry into the RCD. In addition, the dedicated HPT also conducted extensive surveys of various pipes and valves in the FP heat exchanger and T-50 rooms.

During the sluice, operations and RP staff monitored the system's flow and pressure parameters from the C-40 control panel, coordinated the sluice with control room staff, and observed the progress by monitoring the resin in the sight glass and the dose rates in P-107 (which ranged up to 900 millirem per hour [mrem/h] during this evolution). The sluice was conducted until P-107 dose rates returned to approximately 10 mrem/h, at

which time the T-50 dose rate at the bottom of the tank had been reduced to 1 R/h in the latter portion of the sluice. The staff noted that some of the resin appeared to be residual resin from T-69. The T-69 tank was part of the sluice recirculation pathway that was known to contain material that accumulated from past operations.

Radiation surveys conducted the next day showed slightly elevated levels in some piping, indicating the presence of small amounts of spent resin. Since most of this piping was in remote areas, the staff planned to review whether further flushing would be ALARA. The ED data showed that the collective dose for this task was below the dose estimate, which was indicative of the effective RP controls.

c. Conclusions

The RP and operations staff effectively coordinated and controlled the activities associated with the fuel pool resin sluice. During the evolution, communication, surveys, ALARA measures, and system monitoring were thorough, and the task was successfully completed with a reasonable dose.

R2 Status of RP&C Facilities and Equipment

R2.1 Calibration of the Area and Process Radiation Monitors

a. Inspection Scope (IP 84750)

The inspectors reviewed the Final Safety Analysis Report (FSAR), the Technical Specifications (TS), the Offsite Dose Calculation Manual (ODCM) and the applicable procedures; conducted a walkdown of the radiation monitoring system (RMS); and reviewed representative calibration data. The inspectors also interviewed engineering and Chemical and Radiological Services (C&RS) personnel regarding the management of the RMS.

b. Observations and Findings

The inspectors walked down the RMS with site staff and noted that the number and location of the monitors was consistent with the FSAR. The staff was knowledgeable about the status and control functions of the various monitors, and no materiel condition concerns with the monitors or the control room readouts were identified. The RMS was classified as an a(2) system in accordance with the maintenance rule. Plant data demonstrated that the process radiation monitor availability remained above 95% for the past two years, which allowed the system to remain in the a(2) status. The excellent availability and materiel condition resulted, in part, from aggressive actions taken by the staff to address problem monitors. In particular, the staff replaced the service water discharge monitor (RE-0833), the circulation water discharge monitor (RE-1323), and the component cooling water monitor (RE-0915) detectors to correct previous performance problems. In addition, the power supplies for a containment monitor (RIA-1808) and the fuel building addition vent (RE-5712) were replaced, which improved the performance of these detectors. At the time of this inspection, the staff experienced

problems with RIA-1817, a containment radiation monitor, and RE-0202, the failed fuel monitor. Since the problems with these monitors were associated with the design of the monitors, the staff planned to replace RIA-1817, and various options to increase the flow of primary coolant to restore the RE-0202 operability were under an engineering review.

The inspectors noted that the RMS calibrations were conducted in accordance with station procedure. All of the RMS monitors were first calibrated electronically, followed by detector calibration with an appropriate radiation source. The inspectors noted that the electronic "As Found" readings were within the required tolerances, which indicated electronic stability. Every six months, the staff used a 250 millicurie cesium-137 source to calibrate the area radiation monitor detectors, and the "As Found" readings for the past two calibrations were all within the listed tolerances (which were decay corrected), indicating stable performance. The process radiation monitor detectors were calibrated with a sample of either liquid from the primary coolant system (PCS) or gas from the Volume Control Tank or a gas decay tank every 18 months. The radionuclide content of these calibration sources was quantified by counting the sample on a gamma spectrometry system that had been calibrated with radionuclide standards traceable to the National Institute of Standards and Technology (NIST). The calibration media was then circulated through the detector chamber, or a mock-up, and the detector response at several concentrations was analyzed graphically. Only a linear response was acceptable for process radiation monitors. The inspectors determined that the calibration methodology was appropriate.

However, the inspectors noted that although the TS required an 18 month frequency for process radiation monitor calibrations (with a 25% extension period allowed), the last calibrations for a number of these monitors were completed well into the extension period. In particular, the last two calibrations for the High Range Noble Gas Monitor (RIA-2327) were each completed beyond the 18 month frequency. In addition, the last 1998 quarterly channel functional test and the third quarter 1997 test of this monitor were completed beyond the ODCM 92 day interval, but within the allowed extension. Routinely extending the intervals between calibrations and functional tests increases the probability that requirements will not be met, particularly should problems arise during the tests. Plant staff stated that there have been problems in scheduling for both C&RS and Instrument and Control personnel required for these calibrations and that calibrations scheduled during refueling outages were generally conducted after the outage. The inspector discussed the routine use of the TS extension period with C&RS and plant management, who indicated that this scheduling issue would be resolved to ensure that the extension period would be used only when necessary.

c. Conclusions

The calibration of the area and process radiation monitors was conducted appropriately, and the data indicated that the RMS electronics and detectors functioned properly. No materiel condition issues were identified, and the replacement of problem components improved RMS performance. The inspector noted that a number of the process radiation monitor calibrations were done in the TS extension period, and the plant management stated that this scheduling issue would be resolved.

R2.2 Channel/Functional Checks and Compensatory Actions for the Process Radiation Monitors

a. Inspection Scope (IP 84750)

The inspectors reviewed the TS, the ODCM, and applicable procedures; observed a monthly channel functional test; and interviewed plant personnel regarding RMS channel and function checks. The inspectors also reviewed RMS surveillance data for 1997 and 1998 and reviewed the implementation of compensatory actions for inoperable process radiation monitors.

b. Observations and Findings

The inspectors observed a monthly channel function check. The procedure required the C&RS staff to verify that the monitors respond and annunciate appropriately when exposed to an internal check source. For the engineered safeguards pump room monitors, the staff also verified the high voltage settings, the alert alarm and high alarm control room annunciations, and the alert and high alarm setpoints, and ensured that the system isolation functions operated properly. All of these settings were correct, and the alarms and isolations functioned as required. Although the inspectors verified that the safeguards high alarm setpoint was less than the TS limit (220,000 counts per minute), the data entered on the test form did not indicate that this requirement was verified during each test. The C&RS staff planned to revise the form to include this verification. A recent C&RS review also confirmed that this channel function test met the TS surveillance requirements, and past monthly test data demonstrated that the frequencies were appropriate and that the monitors continued to function as intended.

The inspectors also reviewed quarterly surveillance data for the process radiation monitors. The quarterly surveillance verified the high voltage settings, the alert alarm and high alarm setpoints, and the proper response of the Radioactive Gaseous Effluent Monitors (RGEM). The data demonstrated that all these settings were correct and that the RGEM monitors responded as required. The inspectors also verified that control room staff performed the shiftly channel check for those RMS monitor listed in TS 4.17.

The inspectors reviewed the compensatory actions for three process monitors which had been inoperable. The service water discharge monitor (RE-0833) was out-of-service (OOS) October 21-December 8, 1997 (during the replacement of the monitor) and again from July 4-7, 1998 (which was caused by the penetration rainwater into the junction box). The inspectors verified that staff collected and analyzed service water samples daily as required by the ODCM. The failed fuel monitor, RE-0202, was inoperable since October 11, 1997, and the C&RS staff collected and analyzed PCS samples daily, as required by TS Table 4.2.1. The inspectors discussed with plant staff the recurrent OOS status of RE-0202, and the challenges to the staff to collect and analyze PCS samples daily to maintain TS compliance for an extended period of time. The engineering staff stated that actions to resolve the low flow issue were ongoing, and plant management indicated that the restoration of this monitor to service was a priority item.

Finally, the steam generator blowdown effluent line monitor (RIA-0707) was taken OOS on July 8, 1998. Problems with the heat exchanger caused the temperature of RIA-0707 to rise to approximately 200 degrees, which resulted in anomalous readings. Per the ODCM, the staff was required to analyze grab samples every 12 hours during effluent releases from this pathway. Although the staff collected two blowdown samples, the monitor was OOS for less than 12 hours, and no blowdown effluent releases were conducted during this period. Consequently, the ODCM compensatory actions were not required. However, the inspector noted that the analysis performed and recorded by the chemistry staff were not consistent with the ODCM lower limit of detection for principal gamma emitters and that the ODCM-required analysis for iodine-131 was not conducted. Although no violations were identified, the inspector discussed with C&RS supervision whether these ODCM requirements would have been implemented in the event that releases were conducted while RIA-0707 was inoperable. The C&RS staff planned to review the applicable procedure and ensure that the procedure contained sufficient instruction ensure compliance with the ODCM.

c. Conclusions

The staff conducted the daily, monthly, and quarterly channel function checks in accordance with station requirements, and the results indicated that the monitors continued to perform as intended. The compensatory actions for inoperable process radiation monitors were satisfactory, but the inspector identified issues regarding the challenge to and the guidance for chemistry personnel.

R2.3 Calibration of the Personal Contamination Monitors

a. Inspection Scope (IP 83750)

The inspectors reviewed the calibration and operation of the following personnel contamination monitors (PCMs): the Eberline PCM-1Bs located at the auxiliary building exit and the Eberline PM-7s located at the protected area boundary in the security gate house. The inspectors also reviewed the applicable procedures and interviewed plant staff regarding PCM calibration and operation.

b. Observations and Findings

The inspectors reviewed the last two calibrations of the PCM-1B monitors. The staff performed the calibrations in accordance with applicable procedures, and an appropriate radiation source was used. The weekly source check of the PCM-1B monitors was performed using a 2 nanocurie (nCi) source of cesium-137 (Cs-137) and technicium-99 which demonstrated the monitors ability to reliably detect contamination as low as 5000 disintegrations per minute. These source checks were successfully completed.

However, during a discussion and demonstration of the calibration procedure, the inspectors noted that the low limit fail setpoints for one PCM-1B were not within 10% of the average channel background and were set in the non-conservative direction (too low). This setpoint was verified and recalculated during the weekly PCM-1B detector

source check. This setpoint's function was to enable the PCM to place itself in the fail mode when the detector background count rate was below this limit, which would indicate a potential problem with the unit. Although the non-conservative low limit fail setpoints would not significantly impact the PCM's capability to detect contamination, the use of a non-conservative low limit fail setpoint could potentially result in plant staff using a defective PCM. The C&RS staff reviewed these setpoints on other PCM-1B setpoints and found several other detectors with incorrect, non-conservative low limit fail setpoints. The licensee determined that the incorrect setpoints were attributable to calculational errors during the calibration process. The C&RS supervision planned to resolve this issue prior to any future calibrations.

The inspectors also reviewed the last two calibrations for the PM-7 monitors. The calibrations were performed in accordance with the procedure and an appropriate radiation source was used. The PM-7 monitors had a reliably detectable activity (RDA) of 100 nCi at the 95% confidence level. The maximum RDA was set at 200 nCi and the actual RDA, which was determined by the monitor during calibration, was between 40-90 nCi for each detector in both the PM-7 monitors. No problems were identified.

The PM-7 was also source checked weekly with an 84 nCi Cs-137 source. The inspectors observed that the detectors alarmed with a cobalt-60 (Co-60) source of approximately 32 nCi. The inspectors noted that 50% of the tests performed with the Cs-137 check source located on the outside of the right shoe did not result in an alarm. An HPT determined that the RDA was set at 83 nCi for Zone 5 (lower right leg); therefore, the source strength was approximately the same as the RDA. In addition, when tested using the Co-60 source, the PM-7 alarmed Zone 3 (upper right side) when the source was located in the left shoe and also when the source was in the left pocket. The inspectors expressed concern that this alarm would lead the RP staff to look for personnel contamination at a location that was incorrect. The licensee acknowledged the problem and planned to investigate the anomolies and to contact the vendor for additional support. The inspectors also reviewed the passive monitoring justification document and determined that the methodology was appropriate.

c. Conclusions

Overall, the management of the PCMs was effective, as evidenced by the successful completion of calibrations and operational checks at the required frequency. However, an issue was identified regarding the fact that a security gate house PM-7 monitor alarmed in an incorrect zone when the source was not located near that zone. In addition, the inspectors noted that a calculational error resulted in a non-conservative low limit fail setpoint for the PCM-1Bs.

R8 Miscellaneous RP&C Issues

R8.1 (Closed) Unresolved Item 50-255/97016-03: Accident high range iodine cartridge well beyond shelf life and lack of counting for laboratory analysis of this geometry. The inspectors verified that the quarterly change out of this cartridge had been incorporated into the plant's Periodic and Predetermined Activity Control (PPAC). The inspectors

observed a successful change out of this cartridge and no problems were identified. The inspectors reviewed the laboratory analysis data for the iodine cartridge that was in place since 1983 and noted that the collection efficiency was 89.67% (~90%) which was consistent with NUREG-0737. Therefore, this filter would have been able to perform the intended function in the event of an accident. Additionally, the gamma spectrometry calibration geometry for this cartridge had been established and added into the counting room computer, and procedure EI 7.10, "Post Accident Sampling, Radioactive Gaseous Effluent Monitoring", was revised to reflect the 15 second grab sample time which was consistent with the FSAR.

The inspectors also reviewed the methodology used to establish a dose-to-curie conversion factor in the event that the iodine cartridge radiation level exceeded one mrem/h during accident conditions. The methodology correctly identified assumptions that were needed, and the inspectors identified no problems with the calculations or methodology. Based on these completed actions, this item is closed.

R8.2 (Closed) Inspection Follow-up Item 50-255/97012-01: Continued operator work around and radiological concerns regarding the waste gas system (WGS). The inspectors performed a walkdown of the WGS with the system engineers. There were no materiel condition problems identified, and the current work request tags were minimal. The number of open corrective work orders had been reduced to four, which was significantly reduced from the 18 that existed in the recent past. Licensee staff significantly improved the material condition of the system and planned a WGS outage during the week of July 20, 1998, to address other issues.

At the time of this inspection, the last known existence of a flammable mixture in the system was in May 1997. The licensee changed the operation of the system by maintaining a slight positive pressure, as opposed to the previously established negative pressure. This pressure change for the WGS resolved several system leaks, since the valves which had been held open by the negative pressure were properly seated by the positive pressure. This resulted in less oxygen leakage into the system and, thus, prohibited flammable mixtures from forming in the WGS. In addition, there were several occasions in the past when gas from the WGS leaked out into the auxiliary building, causing the evacuation of certain areas. As a result of the WGS improvements, there had not been any recent WGS leaks. The C&RS staff expressed confidence that the WGS was functioning properly and that they had no radiological concerns regarding the current operation of the system.

The waste gas surge tank (WGST) had been controlled as a high radiation area due to an accumulation of water/resin in the bottom of the WGST which had occurred for several years. The plant staff cleaned the WGST, and any water which entered this tank during plant evolutions was to be drained after each use. At the time of this inspection, the WGST room was posted as a radiation area, which allowed for easier worker access to the area, when needed. Finally, plant operations procedures SOP-17A and SOP-18A were revised to clarify the WGS operation and improve purging efforts. Based on the completed actions, this item is closed.

X1 Exit Meeting Summary

The inspectors presented the inspection findings to members of licensee management during an exit meeting on July 10, 1998. Plant personnel did not indicate that any materials examined during the inspection should be considered proprietary.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

M. Banks, C&RS, Manager
J. Beer, Technical Support Supervisor
J. Fontaine, Duty HP
M. Grogan, RETS/REMP Analyst
T. Lintzenich, System Engineer
R. Margol, Chemistry Supervisor
T. Neal, Environmental Supervisor
T. Palmisano, Site Vice President and General Manager
L. Phillips, System Engineer
C. Plachta, Radiation Protection Manager, Radiological Services Supervisor
D. Rogers, General Manager Plant Operations
D. Watkins, Duty HP Supervisor
A. Zillins, System Engineer

NRC

P. Prescott, Resident Inspector, Palisades

INSPECTION PROCEDURES USED

IP 84750	"Radioactive Waste Treatment, and Effluent and Environmental Monitoring"
IP 92904	"Followup - Plant Support"

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Closed

50-255/97016-03	URI	Accident high range iodine cartridge well beyond shelf life and lack of counting for laboratory analysis of this geometry (Section R8.1).
50-255/97012-01	IFI	Continued operator work arounds and radiological concerns regarding the waste gas system (Section R8.2).

ACRONYMS USED

ALARA	As Low As Is Reasonably Achievable
C&RS	Chemical and Radiological Services
ED	Electronic Dosimeter
FP	Fuel Pool
FSAR	Final Safety Analysis Report
HPT	Health Physics Technician
IFI	Inspection Followup Item
mrem	millirem
mrem/h	milliremper hour
nCi	nanocurie
NIST	National Institute of Standards and Technology
ODCM	Offsite Dose Calculation Manual
PCS	Primary Coolant System
PPAC	Periodic and Predetermined Activity Control
R/h	Roentgen per hour
RCD	Radiation Controlled Door
RDA	Reliably Detectable Activity
RMS	Radiation Monitoring System
RP	Radiation Protection
RWP	Radiation Work Permit
TS	Technical Specifications
WGS	Waste Gas System
WGST	Waste Gas Surge Tank

PARTIAL LISTING OF DOCUMENTS REVIEWED

Final Safety Analysis Report Sections;
11.5 - Process and Effluent Monitoring and Sampling System
11.6.5 - Area Radiation Monitoring Systems
11.6.8.2 - Area and Process Radiation Monitors
Table 11-15; Process Radiation Service and Equipment
Table 11-16; Area Radiation Detectors

Technical Specifications;
Table 3.16 - Engineered Safety Features System Instrument Settings
Table 4.2.1 - Minimum Frequencies for Sampling Tests
Section 4.0 - Surveillance Requirements
Section 4.17 - Instrument Systems Tests

Offsite Dose Calculation Manual, Appendix A.

Procedure No. MR-14, Revision 16, "Process Monitor Source Check - Monthly".

Procedure No. MR-14 Basis Document, Revision 6, "Process Monitor Source Check - Monthly".

Palisades Nuclear Plant Memo - Channel Functional Test Reviews, dated June 1998.

Procedure No. MR-36, Revision 7, "Service Water Collection and Calculation".

Procedure No. MR-36 Basis Document, Revision 5, "Service Water Collection and Calculation".

Procedure No. MR-41, Revision 2, "Steam Generator Blowdown Collection and Calculation".

Procedure No. RR-84A, Revision 1, "Radioactive Gaseous Iodine/Part Effluent Monitor RIA-2325 Calibration".

Procedure No. MR-84 Basis Document, Revision 3, "Radioactive Gaseous Effluent Monitor Calibration".

Procedure No. COP-31, Revision 15, "Nonradiological Environmental Operating Procedure".

Maintenance Rule Scoping Document

C-PAL-9800303 Evaluation; RIA System Exceeds MR Performance Criteria, dated March 31, 1998

A-PAL-95-067 Process Monitor Evaluation and Upgrade Plan, dated January 15, 1997.

System Health Assessments, Radiation Monitoring System; 1997 and 1998.

Condition Reports C-PAL-97-1760, 98-0046, and 98-0575.